

REMARKS

The Office Action of August 12, 2003 has been reviewed and the Examiner's comments carefully considered. The Examiner is thanked for the courtesies extended to the undersigned in an Interview conducted on November 19, 2003. Accordingly, on December 1, 2003, the Examiner issued an Interview Summary and indicated that claims 1, 11 and 12 of the present application were discussed in view of GB 2077838 to Akeroyd and U.S. Patent No. 5,608,953 to Petzl et al. (hereinafter "the Petzl patent").

The Examiner further indicated that agreement with respect to the claims was not reached, and therefore the Examiner maintained his rejection of the claims over the prior art of record as set forth in the final Office Action. Accordingly, a Request for Continued Examination is filed herewith. The present Preliminary Amendment amends independent claim 1 in accordance with the originally-filed specification, cancels claims 11 and 12 and adds new dependent claims 13 and 14. Support for the amendment to independent claim 1 can be found, for example, in the originally-filed figures in the present application. Claims 1-10 and 13 and 14 remain in this application.

In the final Office Action, the Examiner objected to the drawings under 37 C.F.R. § 1.83(a) as not showing every feature of the invention specified in the claim. Specifically, the Examiner noted that the features in claims 11 and 12 had no support in the figures. Claims 11 and 12 have been cancelled by the foregoing amendment, and therefore this objection is moot. Further, please find enclosed a new set of figures for replacement of the previously-filed informal figures. Applicant submits that these formalized drawings are duplicative of the originally-filed drawings, only in a better form, and no new matter has been added. Entry of the enclosed formal drawings is respectfully requested.

In the final Office Action, the Examiner rejected claims 11 and 12 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. As discussed above, these claims have been cancelled and this rejection has been obviated. Further, claims 1, 5 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by the Akeroyd patent. Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Akeroyd patent in view of EP 318742 to Bonaiti. Claims 6-8 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Akeroyd patent in view of U.S. Patent No. 5,878,834 to Brainerd et al. (hereinafter "the Brainerd patent"). Further, claim 9 stands rejected under 35 U.S.C. § 103(a) as being obvious over the Akeroyd patent in view of WO 93/25822 to Nebot. Finally, claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Akeroyd patent in view of the Petzl patent. In view of the foregoing amendments, the following remarks, the attached documents and the enclosed physical samples, Applicant respectfully requests reconsideration of these rejections.

Independent claim 1 of the present application, as amended, is directed to a karabiner having a generally C-shaped body. The free ends of the body are curved toward each other and form a gap therebetween, and a gate on one end of the body closes the gap. The gate has a locking barrel thereon for locking the gate to the other end of the body, and the barrel includes a region of greater thickness or strength on its face outward of the body when the gate is in a closed position, so as to reinforce the karabiner against inward forces applied to the gate region. The region of greater thickness at least partially overlaps the free end of the karabiner body and surrounds the free end of the body through an angle of at least 25 degrees.

The Akeroyd patent is directed to a safety clip for a harness, including a gate member 12 pivoted on a body member 10 against return spring pressure. The safety clip includes

a ferrule 14 carrying an extended locking portion 16, which is rotatable against spring pressure from the locking position to a position in which the gate member can be opened inward. In order to prevent accidental opening of the clip, the gate member 12 is provided with a ferrule 14 formed with a longitudinal rib 15 having an extended locking portion 16 which normally lies opposite to the adjacent part 17 of the body member 10 so as to abut against it if opening pressure is applied to the gate member 12. In addition, the longitudinal rib 15 also acts as a thumb grip, but does not reinforce the barrel against side loading over a conventional barrel locking mechanism.

The Petzl patent is directed to a snap-hook with locking ring. This hook 10 includes a C-shaped metallic body 12 and a mobile finger 14 pivotally mounted on a spindle 16 located at the bottom end of the body 12. The top part 28 of the ring 18 constitutes a stopping means, which prevents any pivoting movement of the finger 14 toward the inside of the body 12. In order to open the mobile finger 14 the locking bolt 40 must first be unlocked by a pushing action of the forefinger on the ball of the pin 42 against the force of the third spring 48. Using the thumb and forefinger, the ring 18 is turned clockwise to move it to the second unlocking position, which then allows for the pivoting of the finger 14 toward the inside.

With respect to the operation of the presently-invented karabiner, Applicant has attached a series of photos, with explanations, as Exhibit A. These photographs illustrate the use of the present invention and proper operation thereof, which further helps to elucidate the benefits of the karabiner claimed in the present application. Further, these photographs illustrate that, in operation, the mechanism is released, and the barrel is slid to the right. The castilation on the barrel moves freely over the free end of the karabiner body in one optional embodiment. The barrel unit is rotated until the slot aligns with the free end of the karabiner body, and inward pressure is applied to the gate to open the karabiner, such that the free end of the karabiner passes

through a slot. The barrel is thinner inwardly of the body when in an open position to permit maximum gate opening. The pin through the free end of the gate engages with the hook formation on the free end of the karabiner when in a closed position. As illustrated in the last photograph, the barrel wall has a region of thickness, which is thicker outwardly when in a closed position in the region of the slot, but thinner in the opposing area, such that when rotated to open the gate, the barrel interferes to the least possible extent with the karabiner body.

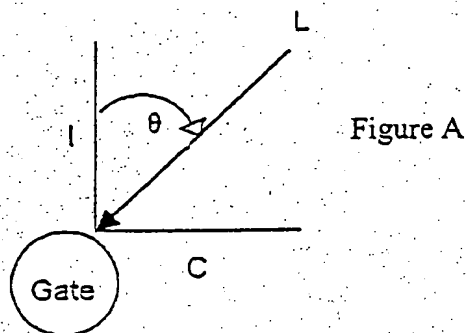
According to independent claim 1 of the present application, as amended, Applicant has specifically defined the region of greater thickness on the barrel. Specifically, the region of greater thickness at least partially overlaps the free end of the karabiner body and surrounds the free end of the body through an angle of at least 25 degrees. With respect to this region of greater thickness on the karabiner of the present invention, and for facilitating a comparison to the karabiner of the Petzl patent, Applicant has provided the Examiner with physical samples of both karabiners for his review.

A key inventive feature of the present invention is the outwardly bolstered barrel of the karabiner body when it is in a closed position. This outward bolstering reinforces the karabiner against side loading, and the provided samples will assist the Examiner in visualizing this concept. In addition, please find an additional set of illustrations detailing various views of the presently invented karabiner as a load is applied. This set of illustrations is attached hereto as Exhibit B. As evidenced by a review of the sample and illustrations, the main object of the present invention is to strengthen the karabiner against inward and sideward forces applied to the gate region. Excessive inward forces will eventually cause the gate to rupture and consequently open. Further, excessive side forces will not necessarily cause the gate to open, because the gate pivots inward (not sideward), but such excessive side forces may still cause the karabiner to jam closed.

A force applied to the gate can be resolved into its inward (I) and cross (C) components. The relationship between the inward (I) and cross (C) components may be described as follows:

$$C = L \sin \theta$$

$$I = L \cos \theta$$



L is the applied force and θ is the angle at which it is applied. Accordingly, the most critical component is the inward force, as this is the most likely to cause the gate to open. Therefore, the worst case scenario occurs when θ equals 0. See Fig. A. The gate of the karabiner of the present invention is bolstered outwardly of the gate to an angle of roughly 60 degrees on either side of the point where θ equals 0. As θ increases, the inwardly resolved component (I) decreases sinusoidally as illustrated in Fig. B. Thus, by bolstering or providing a region of greater thickness on the gate through an angle on either side of $\theta = 0$, the strength of the gate is increased through the most critical loading angles.

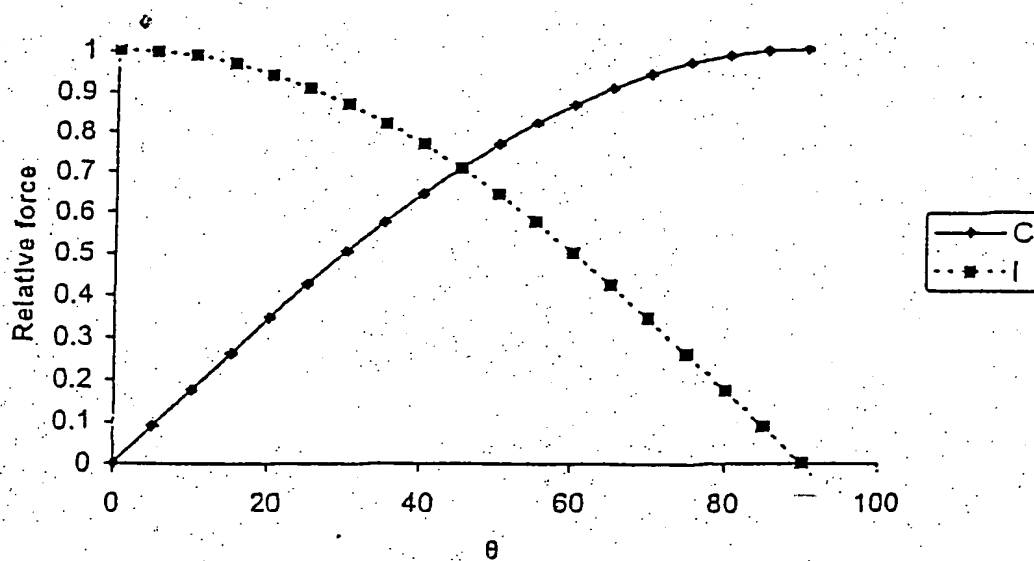


Figure B

The karabiners shown and described in the Akeroyd patent and the Petzl patent are relatively thicker outwardly of the gate when in the closed position, but only through a very small angle on either side of $\theta = 0$. Specifically, in the karabiner of the Petzl patent, finger grips are provided that actually make the gate thinner on either side of $\theta = 0$, and the rib 15 of the karabiner of the Akeroyd patent is very narrow. Accordingly, the strength gained in either of the karabiners of the Petzl patent and/or the Akeroyd patent is lost when loads are applied at angles not much greater than $\theta = \pm 1-2$ degrees. This is highly undesirable since loading at these “weak” angles are the same angles that are most likely to cause the gate to rupture inward and open. The karabiner of the present invention, and as specifically claimed in independent claim 1 of the present application, clearly overcomes this problem by providing a region of greater thickness that extends on either side of $\theta = 0$.

In order to further support this position, Applicant has obtained and encloses herewith a Declaration of one of ordinary skill in the art. Specifically, the Declaration of Nathan Pammenter is attached hereto as Exhibit C. Mr. Pammenter is the Managing Director of Pammenter & Petrie Ltd., which is a manufacturer and supplier of fall protection equipment distributed throughout the world. Mr. Pammenter notes that the Akeroyd patent shows a small fin of material running partially down the length of the barrel, and this extra material has one function only and that is to make it easier to open a locked karabiner with one hand. The karabiner of the Akeroyd patent was offered for sale to the yachting market where cold, wet hands are normal and manipulating standard round barrels is very difficult. As a function of this design, the barrel has a limited rotation and again is very weak when side loaded, particularly as the barrel has a large segment cutout (element 17, Fig. 1). This product was not a commercial

success and manufacturing was halted almost immediately after launch. See Declaration, paragraph 4.

Mr. Pammenter notes that the Petzl patent has a ball lock system. The ball lock design does have a varying thickness in the profile of the locking barrel, but this change in section facilitates the operation of the ball pin in unlocking the mechanism. The change in thickness is a reduction and actually makes the locking barrel weaker at these points. This particular design is ergonomically easy to use, but is well known for being weak when the barrel is front loaded or side loaded. The basic geometry of the barrel is concentric, and is not bolstered in any position to increase resistance to front or side loading. Id., paragraph 5.

Mr. Pammenter believes that the karabiner as shown and claimed in the present application clearly addresses the problems that occur regularly in fall arrest applications, namely that external forces are applied to karabiners through the locking mechanisms, i.e., the middle of the karabiner as well as their designed position of loading (along the back spine via the top and bottom corner radiuses). The forces that act against the locking mechanisms often happen when a lanyard attached to a karabiner is looped around a girder with the trailing end of the lanyard clipped back into the throat of the karabiner. If the user falls, high loads are applied via the locking barrel. The design of the karabiner of the present invention clearly bolsters the barrel at all vulnerable points around the circumference. If the mechanism is manufactured in steel, it can stand loads in excess of 25 kN. Standard locking barrels in steel will break typically at 6 kN. This large increase in strength is achieved by adding material off-center to the normal axis of the barrel in the vulnerable area. Id., paragraph 6.

It is, however, important not to reduce the gate opening of the karabiner, which would restrict the inner connection to other pieces of equipment. The karabiner and system of the present application minimizes this reduction by having the thinnest section of a locking barrel

in contact with the inside of the karabiner back in the gate open position. It does not sacrifice strength in its closed and locked position, as the thin section rests against the inside form of the gate of the karabiner and thus gains support. Accordingly, a karabiner fitted with this mechanism can achieve and withstand loads in excess of 25 kN. Id., paragraphs 6 and 7. On this basis, one of ordinary skill in the art believes that the design and structure of the karabiner of the present invention is unique from any other karabiner mechanism in the art, and provides increased safety and will be commercially successful. Id., paragraph 8.

Applicant respectfully requests consideration of the attached Declaration, as the Examiner is reviewing the continuation application, and specifically independent claim 1 thereof. Through the previous Interview with the Examiner, it is believed that the Examiner may attempt to use the Petzl patent to cure the deficiencies of the Akeroyd patent with respect to the outwardly bolstered barrel. Applicant would like to note that elements 15 and 16 of the karabiner of the Akeroyd patent are parts of a thumb grip, which are provided to facilitate unlocking the karabiner. However, the karabiner of the Petzl patent includes an inwardly molded thumb grip 54. It would not be obvious to combine the inwardly molded thumb grip of the Petzl patent with the nub of the Akeroyd patent, since to do so would merely duplicate the thumb grip. If the reverse situation were to occur, i.e., combining the nub of the karabiner of the Akeroyd patent with the overlapping barrel of the karabiner of the Petzl patent, it would appear that the gate would not be able to close fully, without modification of the design, and hence inventive skill.

As set forth in MPEP § 2143.03, to establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. Further, the Examiner cannot use the claims as a blueprint for locating separate claim elements in separate prior art references without considering the teachings of the prior art as a whole and without considering the complete teachings of the separate references. There is nothing in the Akeroyd patent and the Petzl patent that suggests the desirability of their combined teachings.


Further, there is no incentive to combine these two references together in order to arrive at the claimed subject matter of the present application, as discussed above. The combination of the karbiners of the Akeroyd patent and the Petzl patent would yield a structure that is unworkable, and therefore nonobvious in view of the present invention.

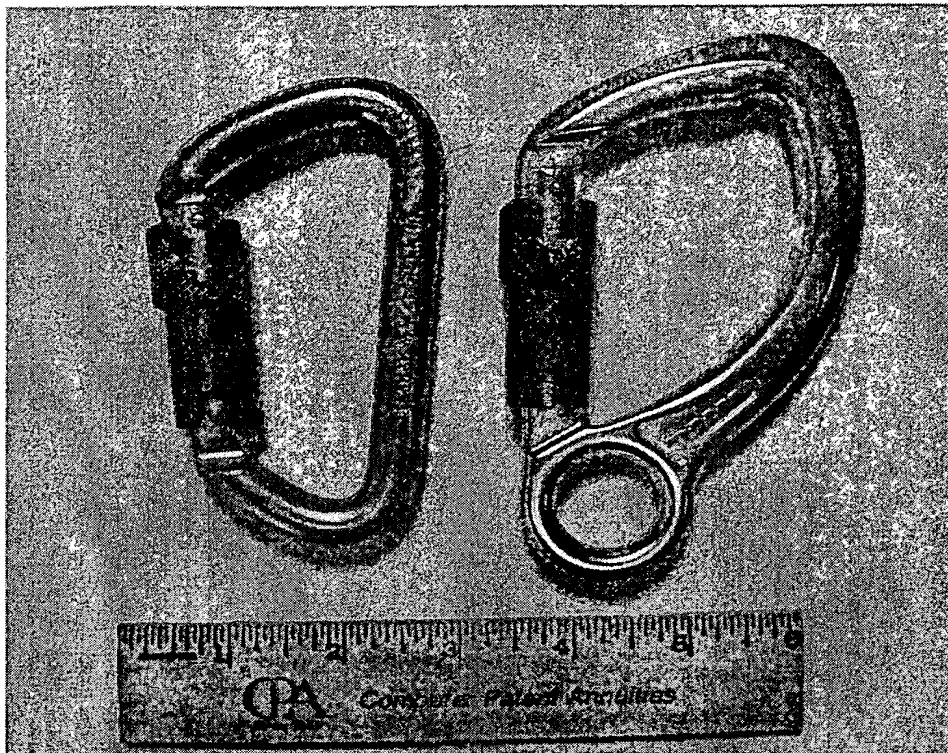
For the foregoing reasons, independent claim 1 is not anticipated by or rendered obvious over the Akeroyd patent, the Bonaiti patent, the Brainerd patent, the Nebot publication and/or the Petzl patent, whether used alone or in combination. There is no hint or suggestion in any of the references cited by the Examiner to combine these references in a manner that would render the invention, as claimed, obvious. Reconsideration of the rejections of independent claim 1 is respectfully requested. Claims 2-10, 13 and 14 depend either directly or indirectly from and add further limitations to independent claim 1 and are believed to be allowable for the reasons discussed hereinabove in connection with independent claim 1. Therefore, for all the above reasons, reconsideration of the rejections of claims 2-10 is respectfully requested.

For all the foregoing reasons, Applicant believes that claims 1-10, 13 and 14, as amended and added, are patentable over the cited prior art and in condition for allowance. Reconsideration of the rejections and allowance of all pending claims 1-10, 13 and 14 are respectfully requested.

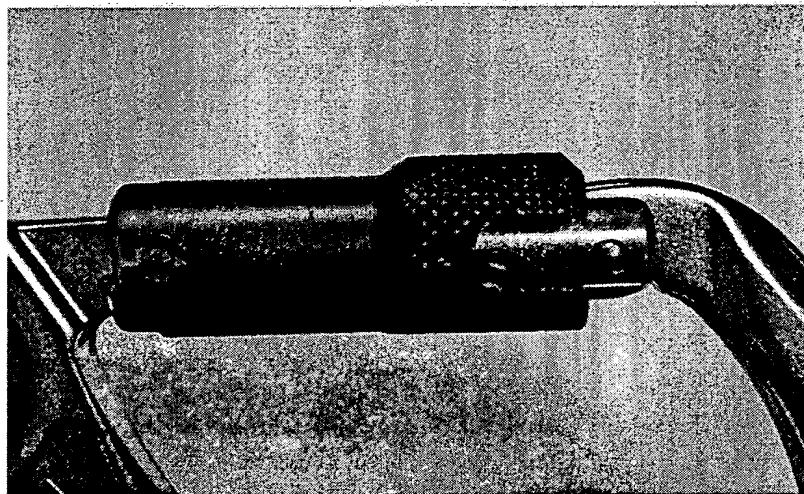
Respectfully submitted,

WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.

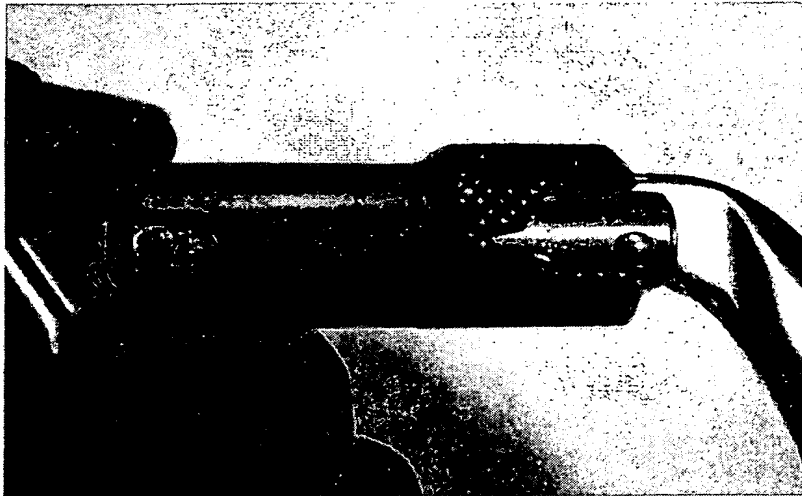
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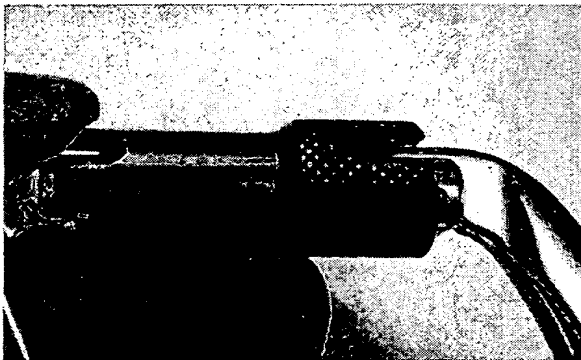
"C" and "Figure-8" variants of karabiner.
Locking gate identical. (Scale in inches).



Mechanism released



Slide barrel right. Allows castellation on barrel (lower left) to move freely over the free end of the biner body. This is the optional feature of extant claim 2 (i.e. the slidable barrel embodiment)



Rotate barrel until the slot aligns with the free end of the biner body.



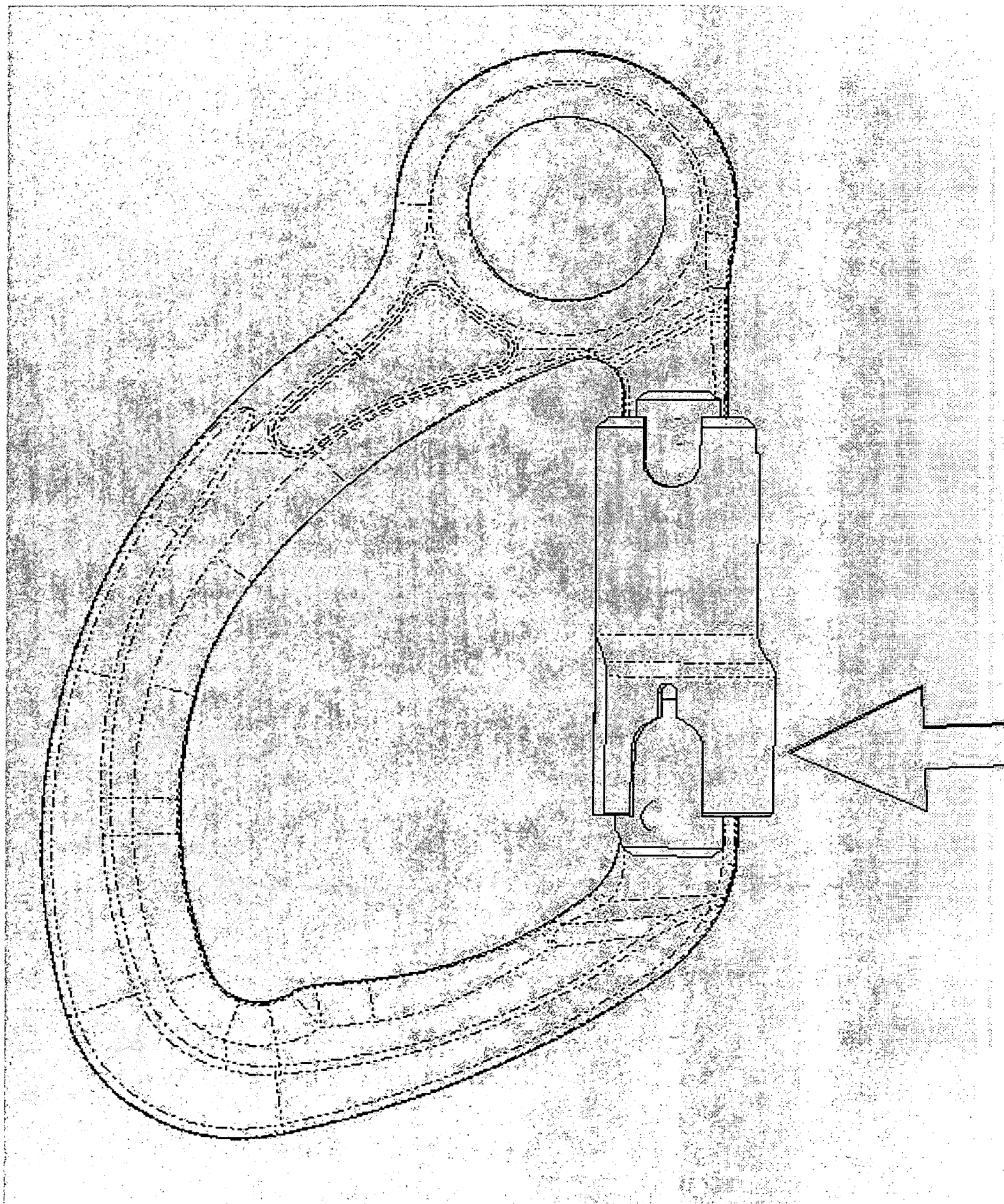
Apply inwards pressure to the gate to open the biner. (Upper) free end of biner passes through slot.

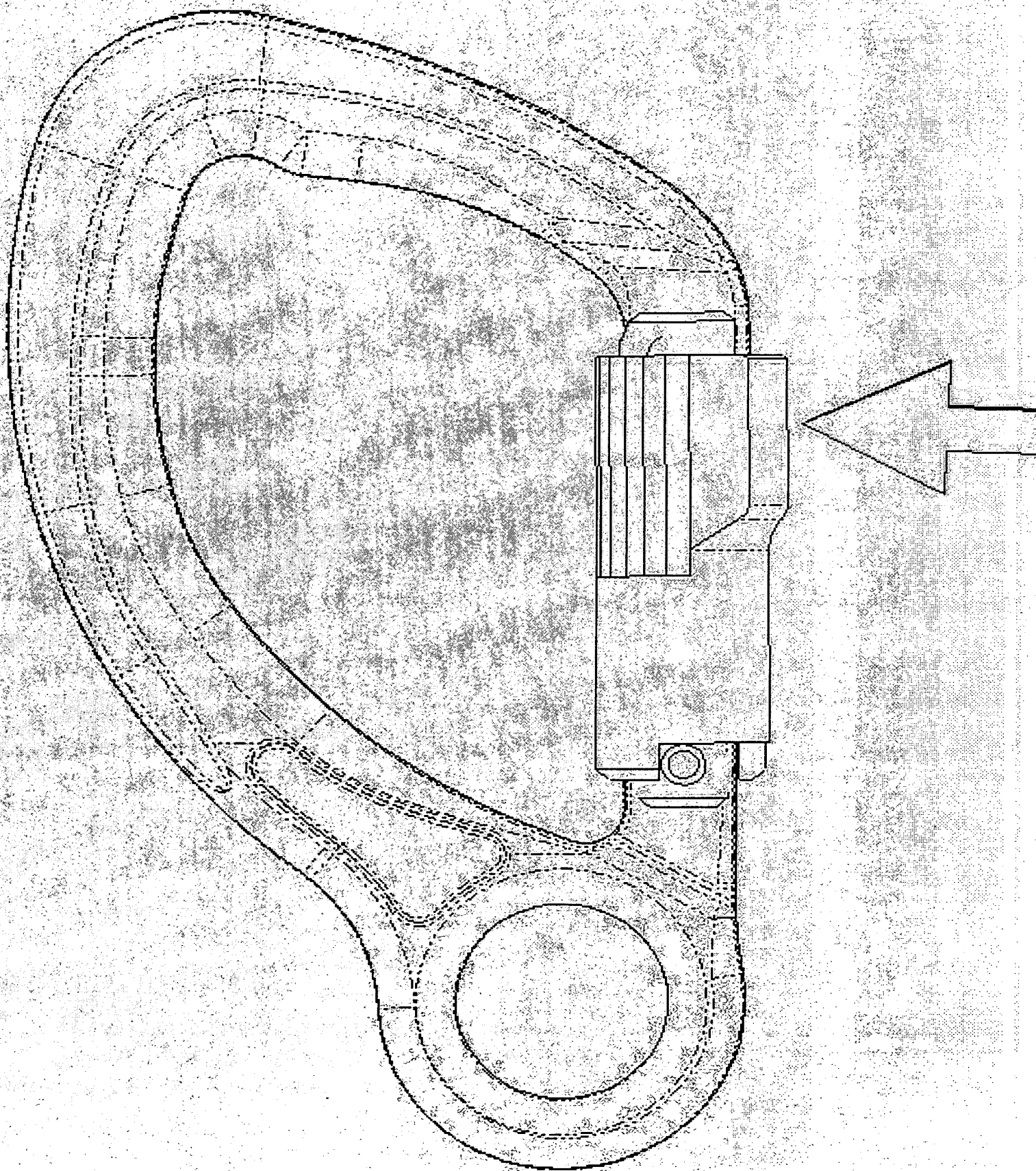


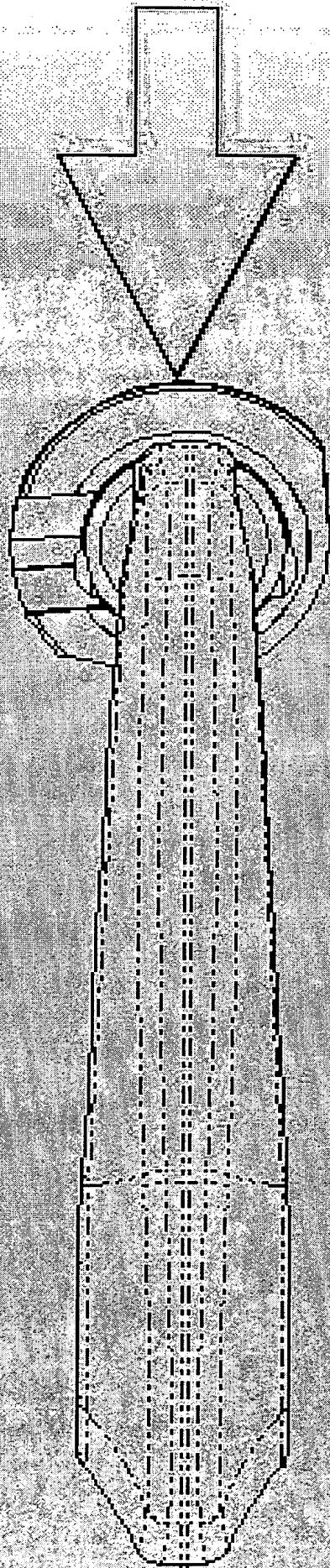
The barrel is thinner inwardly of the body when in an open position to permit maximum gate opening. (The pin through the free end of gate engages with the hook formation on free end of karabiner when in a closed position)

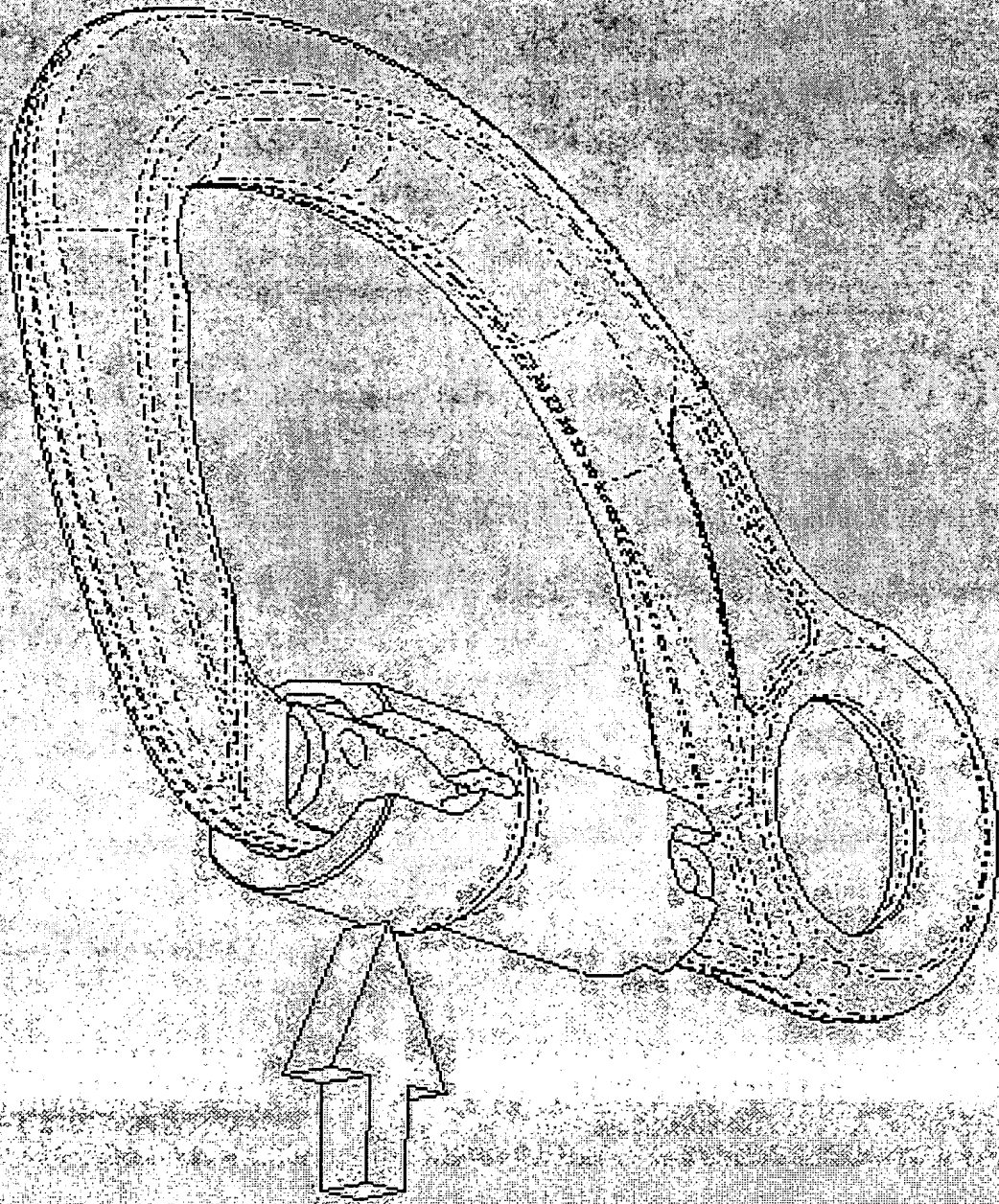


Top view of locking barrel. NB variation in barrel wall thickness i.e. thicker outwardly when in a closed position, thicker in the region of the slot (to compensate for "missing" material), but thinner (on right as viewed from above) so that when rotated to open the gate, the barrel interferes to the least possible extent with the biner body.









IN THE MATTER OF
UNITED STATES PATENT
APPLICATION NUMBER
09/975,088

DECLARATION

1. I, Nathan Pammenter, am the Managing Director of Pammenter & Petrie Ltd, manufacturer and supplier of fall protection equipment based in Birmingham UK. We supply fall arrest equipment broadly throughout the world.
2. I have been asked to comment on the patent application US09/975088 (DMM) in relation to UK patent 2077838A (Akeroyd) and US patent 5608953 (Petzl) as an experienced provider/manufacture of safety equipment. I consider myself competent and fully aware of the user requirements and design functions of karabiners.
3. DMM Engineering Limited produce the "Ovalock" design karabiner, which is the subject of United States patent application number US09/975088.
4. The Akeroyd patent (GB2077838A) shows a small fin of material running partially down the length of the barrel. This extra material has one function only and that is to make it easier to open a locked karabiner with one hand. This karabiner was offered for sale to the yachting market where cold, wet hands are the norm and manipulating standard round barrels proves very difficult. As a function of this design, the barrel has a limited rotation and again is very weak when side loaded, particularly as the barrel has a large segment cut out (part 17, fig 1, Akeroyd patent). This product was not a commercial success and ceased manufacture almost immediately after launch.
5. The Petzl patent (US5608953) has a ball lock system. The ball lock design does have a varying thickness in the profile of the locking barrel but this change in section facilitates the operation of the ball pin in unlocking the mechanism. The change in thickness is a reduction and actually makes the locking barrel weaker at these points. This particular design is ergonomically easy to use but is well known for being weak when the barrel is front loaded or side loaded. The basic geometry of the barrel is concentric, it is not bolstered in any position to increase resistance to front or side loading.
6. Regarding the DMM Ovalock karabiner (US09/975088), the design of this mechanism addresses clearly problems that occur regularly in fall

arrest applications namely that external forces are applied to karabiners through the locking mechanisms i.e. the middle of the karabiner as well as their designed position of loading (along the back spine via the top and bottom corner radiuses). The forces that act against the locking mechanisms often happen when a lanyard attached to a karabiner is looped around a girder with the trailing end of the lanyard clipped back into the throat of the karabiner. If the user falls, high loads are applied via the locking barrel. The Ovalock design clearly bolsters the barrel at all vulnerable points around the circumference. If the mechanism is manufactured in steel, it can stand loads in excess of 25 kN. Standard locking barrels in steel will break typically at 6 kN. This large increase in strength is achieved by adding material off-centre to the normal axis of the barrel in the vulnerable area. It is however important not to reduce the gate opening of the karabiner restricting the interconnection to other pieces of equipment.

7. The Ovalock system minimizes this by having the thinnest section of the locking barrel in contact with the inside of the karabiner back in the gate open position. It does not sacrifice strength in its closed and locked position as the thin section rests against the inside form of the gate of the karabiner and thus gains support from this. If loaded in this attitude a karabiner fitted with this mechanism will achieve 25 kN.
8. I believe this design is different and unique from any other karabiner mechanism I have seen and is a step forward in safety and is clearly commercially saleable.

AND I MAKE THIS SOLEMN DECLARATION conscientiously believing the same to be true.

DECLARED at this 9TH day of FEBRUARY 2004
by the said Nathan Pammenter

Before me


Solicitor

PATRICK MASON
WARRICK 2 0
55 CONNORS ROW
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B3 2A7